AMENDMENTS TO THE SPECIFICATION

In the Title

M-trie ~~Plus: Extended TRIE~~ Based Packet ~~Lookup~~ Processing

In the abstract

~~In a first aspect of the invention, d~~In an embodiment, different aspects of ~~the~~ a packet header and data included in the packet are singled out for attention, rather that just the four byte IP destination address. ~~This allows the M-trie Plus to perform functions that TRIES were unable to do. The current TRIE distinguishes only between the leaf and node type elements and is used only for routing. The M-trie Plus extends this and includes d~~Different information is included in ~~the~~ nodes of the trie~~e~~ ~~which~~ that enables matching and branching on different header fields. ~~The basic building block of all M-trie Plus nodes is an oppointer. The oppointer includes an address and an opcode. In a preferred embodiment, the address included in an oppointer is the address for the next node. The opcode included in an oppointer describes what action the router or switch has to do on the packet label to select the next oppointer leaf on the M-trie Plus data structure. If an oppointer points to the bit termination leaf, the lookup is terminated. High speed packet header processing is achieved by the multiple pipelined threads of the M-trie Plus engine (MPE) and a wide memory bus.~~ In an embodiment ~~second aspect of the invention~~, the ACL of a configuration file in a router or switch is compiled into a~~n ACL - M-~~ trie ~~Plus~~ data structure ~~which is~~ located in the memory of the router or switch. ~~This has the effect of merging routing and ACL processing in a single device. The M-trie Plus data structure 200 is traversed with respect to information included in the packet header, thereby determining whether a packet should be dropped or forwarded. ACL lists are defined in the configuration file of the router or switch. In a~~

~~preferred embodiment, there are two forms of access list in the IOS: the standard ACL and the extended ACL. Standard lists are used to control traffic based on one or more source IP addresses. The extended access list provides a finer granularitys in controlling traffic. ACL definitions provide a set of criteria that are applied to each packet that is processed by the router or switch. The router or switch decides whether to forward or drop each packet based on whether or not the packet matches the access list criteria. Typical criteria defined in ACLs are source addresses, destination addresses or upper-layer protocols of the packet.~~ In an ~~third~~ embodiment ~~aspect of the invention~~, ~~the M-~~a trie ~~Plus~~ data structure ~~200 can~~is used to map a multicast packet header by a sequence of nodes that match on destination address or source address. ~~Each physical port uses the M-trie Plus with the first level nodes matching on the first 8 bits of the destination address, the second level nodes matching on the second 8 bits of the destination address and so on, at each level the nodes correspond to multicast addresses. In a preferred embodiment, the opcode included in a node can specify other operations, such an instructions to compare bytes in the packet header with bytes in a CAM (contest addressable memory) or to direct certain types of packets (for example, voice traffic) to a specified output interface.~~

In the specification

Replace the paragraph on page 5, starting at line 17, with the following paragraph,

In a preferred embodiment, the opcode included in a node can specify other operations, such an instruction to compare bytes in the packet header with bytes in a CAM (~~contest~~ content addressable memory) or to direct certain types of packets (for example, voice traffic) to a specified output interface.

Replace the paragraph on page 12, starting at line 3, with the following paragraph,

The routing or switching device 130 processes data packets 121 from at least one source device 110 and directs them to at least one destination device 140. The routing or switching device 130 includes one or more input interfaces 131, a routing processor 132, an M-trie plus engine 133, an M-trie data structure 200 and a set of output interfaces 134.

Replace the paragraph on page 14, starting at line 4, with the following paragraph,

The M-trie plus data structure 200 includes a tree having a root node 205, a plurality of inferior nodes 210 and a terminal leaf node 215. Terminal leaf node 215 is also an example of an inferior node.

Replace the paragraph on page 15, starting at line 14, with the following paragraph,

The ~~method~~ step 300 is performed by the systems 100 and 200. Although the ~~method~~ step 300 is described serially, the steps of the ~~method~~ step 300 can be performed by separate elements in conjunction or parallel, whether asynchronously, in a pipelined manner, or otherwise. In broad overview, the ~~method~~ step 300 can include routing of packets,

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multicasting, deciding whether packets can be dropped as a function of QoS or CoS and other aspects related to processing of packet headers.

Replace the paragraph on page 16, starting at line 20, with the following paragraph,

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For example (without limitation) a first oppointer can have an opcode ~~110~~ 230 specifying match on protocol field and a pointer (that is address 225) to another node in the M-Trie Plus data structure ~~150~~ 200. This node may have an opcode ~~110~~ 230 that specifies hash and demux on the last byte of the source address. The next oppointer can specify to multiplex on the second byte of the destination address.

Replace the paragraph on page 17, starting at line 12, with the following paragraph,

In a step 335, the M-trie Plus engine 133 accesses the node of the M-trie Plus data structure ~~150~~ 200 that is determined by the address in step 330. The ~~method~~ step 300 proceeds at step 320.

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Replace the paragraph on page 17, starting at line 16, with the following paragraph,

In a step 340, the data packet 121 is passed to one or more output interfaces ~~135~~ 134 or dropped. The decision to pass or drop the packet 121 is responsive to information contained in the terminal leaf node 215.